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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,499	02/20/2004	George Gustave Zipfel JR.	Zipfel 1	7599

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EXAMINER	
SHINGLETON, MICHAEL B	
ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 08/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/783,499	ZIPFEL ET AL.	
	Examiner	Art Unit	
	Michael B. Shingleton	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-42, 52-69 is/are pending in the application.

4a) Of the above claim(s) 12,18,27-29, 40 and 52-58 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-11,13-17,19-26,30-39,41,42 and 59-69 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 5/12/05 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-11, 13-17, 19-26, 30-39, 41, 42 and 59-69 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The conclusion of $[i_{L1}(t) + i_{L2}(t)] \approx 0$ as presented at the top of page 13 of the specification that is representative of the claimed invention, i.e. "the sum of the values of that particular signal variable is substantially constant" or "the baseband components of the at least first and second switching signals being such that, and said loads being interconnected in such a way that, substantially all of the current at baseband frequencies flowing out of one or more of said loads at a given time flows into one or more of the others of said loads" etc. is not supported by the drawings or the description of these drawings as alleged by applicant. Note that in applicant's traversal of the restriction requirement dated 10-18-2004 applicant equates claimed limitations like "the baseband components of the at least first and second switching signals being such that, and said loads being interconnected in such a way that, substantially all of the current at baseband frequencies flowing out of one or more of said loads at a given time flows into one or more of the others of said loads" to that of paragraph [0049] i.e. page 13 of the specification. Page 11 of the specification recites "...when signal PWM is high, lead 33a is (approximately) 10 volts positive with respect to lead 33b, causing FET 35 to be ON and FET 47 to be OFF. A current path is thus established from power supply 31 (supplying a voltage V_2) through FET 35, inductor 39, common-mode inductor 41, load L1 and into power supply 32 (supplying a voltage V_1) and current $I_{L1}(t)$ flows through load L1." Page 12 recites "FETs 35 and 37 are switched in synchrony", which is clearly represented by Figures 3A and 3B, and "gate driver 45, which operates FETs 37 and 55 in substantially the same manner that gate driver 33 operates the half-bridge comprising FETs 35 and 47." Thus when signal PWM' is high, the unmarked gate lead directly connected to transistor 37 is (approximately) 10 volts positive with respect to the unmarked gate lead directly connected to transistor 55, causing FET 37 to be ON and FET 55 to be OFF.

A current path is thus established from power supply 31 (supplying a voltage V_2) through FET 37, inductor 43, common-mode inductor 41, load L2 and into power supply 32 (supplying a voltage V_1) and current $I_{L2}(t)$ flows through load L2. Thus at the time when the PWM and PWM' signals are both high the current $[i_{L1}(t) + i_{L2}(t)]$ is not approximately zero in accordance with applicant's specification and drawings. Note the sign convention of these two currents as shown in Figures like 4A. Applicant's basis of the invention "[a]s a consequence of the fact that the baseband signal used to generate signal PWM' is an inverted version of the baseband signal used to generate PWM, the baseband current flowing through load L1 is the inverse of—that is, flows in the opposite direction from—the baseband current flowing through load L2. Loads L1 and L2 are thus driven in a push-pull fashion. That is, as baseband current flows through load L1, a substantially equal amount of baseband current flows in the opposite direction through load L2." is not enabled in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention without undue experimentation. In fact the invention described and shown by applicant in particular note pages 11 and 12 of the specification, appears to be a description of the exact opposite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-11, 13-17, 21-26, 30-39, 42, 45, 62-67 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokumo et al. 4,968,948 (Tokumo) in view of Nishijima 5,001,746 (Nishijima).

The following prior art rejection is made based on the similarity of the claimed structural limitations and the prior art reference in an attempt to further the prosecution of the instant application. Figures 1, 2A, 2B, 2C, and 2D along with the relevant text discloses the claimed switching amplifier arrangement having the two claimed switching elements 5 and 5' that compare to elements like 35 and 47, and 37 and 55 of the disclosed invention, the two claimed series inductors 14 and 15 that equate to elements 39 and 43 of the disclosed invention, the claimed common-mode inductor 11 that is the same structure as applicant's element 41 of the disclosed invention and the capacitors 7 and 7' that form the

two loads of the claimed invention and equate to elements L1 and L2 of the disclosed invention. Note these capacitors are considered loads for they are connected in the same manner as applicant's capacitive loads L1 and L2. Note that capacitor 7 is connected to one leg of the common-mode inductor 11 just like L1 is connected to the one leg of the common-mode inductor 41 and the other end of the capacitor 7 is connected to a potential that is less than V_{cc} just like the other end of L1 is connected to a potential V_1 that is less than V_2. Similarly, capacitor 7' is connected in the same manner as that of L2 of the instant application and thus is considered every much a load as applicant's invention. Note that even the outputs of the switching elements 5 and 5' form the same "alignment" as the outputs of the switching elements 35 and 47, and 37 and 55 of the claimed invention. Namely the waveforms are aligned such that at the peak of the triangle waveform and the highs of the two pwm waveforms line up. Note Figures 2A, 2C, and 2D of Tokumo. This equates to the waveforms of 3A and 3B of the disclosed invention. Column 3, beginning with line 10 thereof clearly recites that the common-mode inductor has the function of filtering out the carrier, what applicant calls the "switching band components". Also in particular column 3, around line 25 of Tokumo recites that this common-mode inductor can be made smaller because of its arrangement caused by the "little possibility of magnetic saturation". This is the same objective of "minimizing core flux and consequently core size" as recited by applicant (See paragraph [0063]) of the specification. Therefore, because the structure of Tokumo is the same as that claimed, has the same waveforms powering/controlling the device and exactly equates to the basic arrangement of the disclosed invention shown in Figures 4A and 4B, all the recited functions like are inherent in the structure of Tokumo. Note that element 9 of Tokumo being that it is a speaker inherently performs a filter function and is a mechanical load. Note that V_2 is equal to $+V_{cc}$ and V_1 is equal to ground and V_G is equal to $-V_{cc}$ in Tokumo and thus the equation $V_2 > V_1 > V_G$ is clearly satisfied. Tokumo is silent on the details of the element 9 except for stating that it could be "for example a speaker" (See column 1, around line 34).

Nishijima discloses that a conventional speaker includes the high impedance speaker and is an art recognized equivalent to a lower impedance unit (See column 5, around line 27).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replaced the conventional speaker 9 of Tokumo with a high impedance speaker unit because as the Tokumo reference is silent on the exact structure of the speaker one of ordinary skill in the art would have been motivated to use any art-recognized equivalent speaker such as the conventional high impedance unit as taught by Nishijima. Note that "substantially all of said at least one baseband component of said first switching signal being a current that flows into said first reactive load and substantially all of said at least one baseband component of said second switching signal being a

current that flows into said second reactive load" and similar claim language is an obvious consequence of the invention made obvious above. With the impedance of the speaker beign high most of the baseband current would be used to charge and discharge the load capacitors 7 and 7' in Tokumo.

Claims 8, 20, 42, 45, 62, and 69 all recite "a mechanical load connected to at least one of said reactive loads" and that the mechanical load includes means for generating acoustic sonar signals.

Tokumo and Nishijima are silent on the details of the speaker being for a sonar environment. However, one common use for a speaker is as a sonar-transmitting element. A sonar-transmitting element is a well-known speaker element for use underwater. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have replaced the speaker element of Tokumo and Nishijima with one that transmits under water, i.e. a sonar transmitting, because, as the Tokumo and Nishijima references are silent on the exact speaker utilized one of ordinary skill in the art would have been motivated to use any art-recognized equivalent speaker element such as the conventional high impedance underwater speaker, i.e. sonar transmitting element. Furthermore, the speakers themselves of Lastruci and Nishijima would be fully capable of transmitting a sonar signal just by directing the sound of the speaker toward the water.

Claims 59-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lastruci or Tokuma et al. in view of Mieda et al. 6,229,387 (Mieda).

Lastruci and Tokuma both disclose an apparatus having a first and second switching signal generating means (Note 5, 5' of Tokuma and 1 and 1' of Lastrucci). There is clearly a modulating or "baseband" signal superimposed on the carrier or switching frequency of both Lastrucci and Tokumo. Note the abstract of Lastrucci and column 3 around line 15 of Tokumo). The common mode cancellation circuit Lx and Lx' provides a common-mode rejection filter in Lastrucci (See column 4, around line 52) and the being that the transformer arrangement of Tokumo is the same as that of Applicant's element 41, this component Tokumo is seen as the common-mode rejection filter. Both Lastruci and Tokuma are silent on the use of multiple speakers (first and second reactive transducer) for the single speaker. Note the use of laod filtering circuitry Cp of Lastrucci and 7 and 7' of Tokuma. Air forms the mechanical load for the common speakers of Lastruci and Tokuma. Tokumo and Nishijima are silent on the details of the speaker being for a sonar environment. However, one common use for a speaker is as a sonar-transmitting element. A sonar-transmitting element is a well-known speaker element for use underwater. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have replaced the speaker element of Tokumo and Nishijima with one that transmits under water,

i.e. sonar transmitting, because, as the Tokumo and Nishijima references are silent on the exact speaker utilized one of ordinary skill in the art would have been motivated to use any art-recognized equivalent speaker element such as the conventional high impedance underwater speaker, i.e. sonar transmitting element. Furthermore, the speakers themselves of Lastruci and Tokuma would be fully capable of transmitting a sonar signal just by directing the sound of the speaker toward the water.

It is well known that two speakers (transducers) connected in series is an art recognized equivalent to a single speaker. In particular note column 8 around line 20 of Mieda that describes one embodiment when the speaker 4 is a single speaker "is just one" and when the speaker is composed of two speakers 4 connected in series. Note that the speakers 4 of Mieda are reactive because of the voice coils. Mieda employs typical speaker structures.

Therefore, because these two transducer means were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute two series connected speakers, i.e. reactive transducers, for the speaker element of Tokuma or Lastruci. One of ordinary skill would have been additionally motivated to make the substitution so as to provide sound in a plurality of locations. It is an obvious consequence that the first and second switching signals of Lastuci and Tokuma will be applied through the common mode rejection filters of Tokuma and Lastruci to the at least first and second reactive transducer elements respectfully. Note the connection of element 9 or the series connected speakers that replace element 9 in Tokumo to the transformer 13. Also note same basic connection of the series connected speakers that replace speaker Z in Lastrucci to the transformer composed of elements like L, L', Lx and Lx'. Note that the claims do not recite that all of the first and second switching signals flow through the first and second switching reactive transducer elements respectfully. Also these loads would still retain the same function of Lastruci and Tokuma of being isolated from the common mode components and the modulating signal or baseband signal of alternating polarity is clearly applied to these loads.

Applicant's arguments filed 5-13-2005 have been fully considered but they are not persuasive.

It is noted that applicant in traversing the restriction has lost the special status of the instant application (See MPEP 708.02). If the Office determines that all the claims presented are not obviously directed to a single invention then applicant must make an election without traverse as a prerequisite to the grant of special status and if applicant refuses to make an election without traverse the petition will be denied. It is also noted that applicant recites claims like 55, 56, 57 as "Original" or "Currently Amended", however, the correct status is either "withdrawn" and "withdrawn-currently amended" for these claims (See MPEP 601 and 37 CFR 1.121).

In response to applicant's remarks concerning the restriction requirement. First of all, the restriction requirement was made final in the previous office action and a proper response would be by petition (See MPEP 818.03(c)). Applicant states that MPEP 806.04(d) states that "a claim is generic if it includes two or more of the disclosed embodiments within the breath and scope of definition". The examiner respectfully disagrees. First of all it is unclear what applicant means by the "breath and scope of definition". A generic claim is one that is of such breath and scope that is encompasses all the embodiments. It has to be generic to all to be considered a generic claim. This is what is set forth by MPEP 806.04 (d). The examiner specifically pointed out how these claims 9, 34 and 52 do not read on all of the disclosed embodiments. It is also noted that Applicant has not provided a clear admission or evidence that the species are obvious variants.

In response to the 35 USC 112 rejection, applicant states that inductor 41 blocks those frequency components in the bridge voltage from entering the load. This contradictory to the original disclosure. As recited in the previous office action and pages 11-13 of the original disclosure currents like $i_{L1}(t)$ flows at the switching frequency thus the inductor 41 does not block the switching frequency but passes the switching frequency. The Affidavit filed by Mr. George Zipfel is not persuasive for it is an opinion and does not present any facts, experimental results, calculations based on values of the invention in support of the opinion. In the Affidavit Mr. Zipfel recites that "one cannot simply conclude that he instantaneous currents in the loads L1 and L2 are the same whenever signals PWM and PWM' are the same". That is not the issue at hand, the issue is whether the addition of the two currents $i_{L1}(t)$ and $i_{L2}(t)$ are substantially zero over time. Mr. Zipfel recognizes that PWM and PWM' are both high or both low for a substantial amount of their cycles, and thus since $V = L(di/dt)$ the voltage is both high or both low for a substantial amount of time to cause a current. This is supported by the original disclosure that recites current flowing in and out of the load L1 at the switching frequency. Mr. Zipfel states that PWM and PWM' are "inverse of one another". They are not inverse in the sense that one is positive and one is negative. Looking at Figures 2A and 2B of the original disclose shows both baseband signals as both being positive. One will have a greater positive value than the other but never-the-less the base band signals are both positive. It is also true that with one having a greater value than the other that the pulse width produced by the value of the first baseband signal B will be different than the pulse width produced by the value of the second baseband signal B'. As a positive voltage, i.e. transistor 35 is on, will produce a positive current and a positive voltage, i.e. transistor 37 on, will produce a positive current according to applicant then how does one of these currents somehow switch direction? No support calculations of circuit analysis is given. Mr. Zipfel states that is the widths that gives rise to the opposite phases of the baseband signals flowing in the loads, and that voltage across the common mode inductor is almost equal and opposite, but this is Mr. Zipfel's opinion and it is still contradictory to applicant's disclosure that two positive voltages each on the respective input of the inductor 41 will each produce a positive load current. Note that significant portions of the cycle where the PWM and PWM' signals are both positive and both low. No equations, and no supporting values and most importantly no details of the structure are given to support the conclusion made by Mr. Zipfel. Tokumo shows the same basic transformer structure as that shown by that of Applicant. There appears to be no difference and thus with Tokumo's transformer being clearly capable of passing the switching frequency it seems that Applicant's will also as Applicant has not shown any difference in the structure of Applicant's transformer 41 and Tokumo's transformer 13. Note that Figrue 6A and 6B are directed toward the piezoelectric element. Furthermore, the Affidavit nor does applicant remarks show how the equation $i_{L1}(t) + i_{L2}(t)$ substantially equals zero for the entire time period. This equation is the crux of the invention, but does not follow from the drawings or the description of the currents in the invention.

Applicant states that capacitors 7 and 7' "are not loads in the sense of receiving the amplified baseband signal. Indeed, the values of those capacitors is such as to cause them to be filters that, in combination with chokes 11 and 12, eliminate the carrier signal." Thus the switching frequency will be passed to ground by these capacitors, but they still present a capacitive load(s) to the baseband frequency and a small load to the switching frequency. It is the charging and discharging, i.e. the baseband current flowing in and out of these capacitive loads that powers element 9. Applicant states that the claims distinguish over the Tokumo reference by the newly added limitation of "substantially all of said at least one baseband component of said first switching signal being a current that flows into said first reactive load and...". Since Tokumo is silent on the impedance of element 9, to alledge that a "non-substantially all" flow of current into the reactive load(s) is unsupported. In fact, the fact that Tokumo is silent on the impedance of element 9 is support that one of ordinary skill would have been motivated to utilize any conventional speaker element 9 including a high impedance element. This amendment necessaites the new rejection.

It is noted that Applicant does not provide remarks concerning the function of the transformer 13 of Tokumo. As noted in the previous and present Office actions given the similarity of these structures the structure of Tokumo is seen as providing the same function as that of Applicant.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael B. Shingleton whose telephone number is (571) 272-1770.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal, can be reached on (571)272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306 and after July 15, 2005 the fax number will be 571-273-8300. Note that old fax number (703-872-9306) will be service until September 15, 2005.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MBS
July 15, 2005

Michael B Shingleton
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